

HAT2058R/HAT2058RJ

Silicon N Channel Power MOS FET
High Speed Power Switching

HITACHI

ADE-208-934 (Z)

1st. Edition

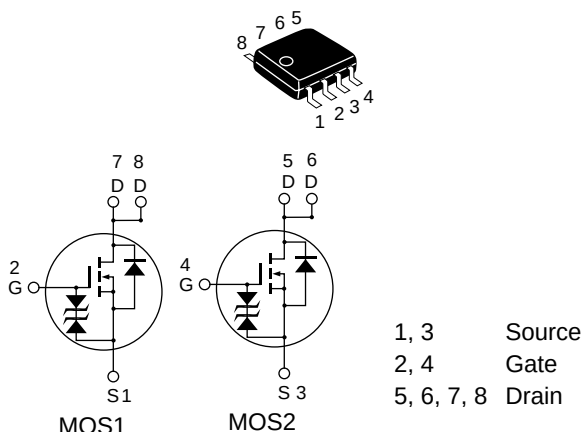
Mar. 2001

Features

- Low on-resistance
 - Capable of 4 V gate drive
 - Low drive current
 - High density mounting
 - “J” is for Automotive application
- High temperature D-S leakage guarantee
Avalanche rating

Outline

SOP-8



Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings		Unit
		HAT2058R	HAT2058RJ	
Drain to source voltage	V _{DSS}	100	100	V
Gate to source voltage	V _{GSS}	±20	±20	V
Drain current	I _D	4	4	A
Drain peak current	I _D (pulse) ^{Note1}	32	32	A
Body-drain diode reverse drain current	I _{DR}	4	4	A
Avalanche current	I _{AP} ^{Note4}	—	4	A
Avalanche energy	E _{AR} ^{Note4}	—	1.6	mJ
Channel dissipation	Pch ^{Note2}	2	2	W
	Pch ^{Note3}	3	3	W
Channel temperature	Tch	150	150	°C
Storage temperature	Tstg	−55 to +150	−55 to +150	°C

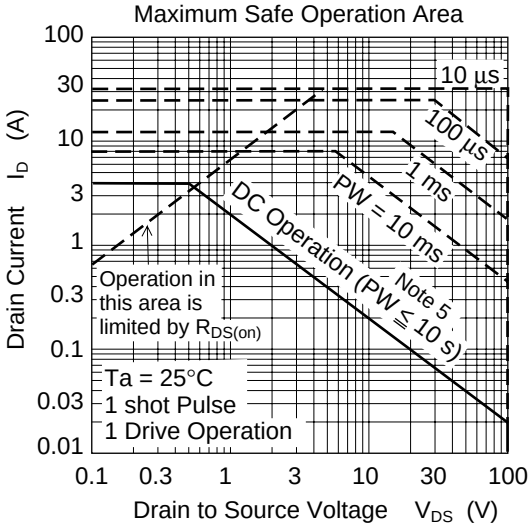
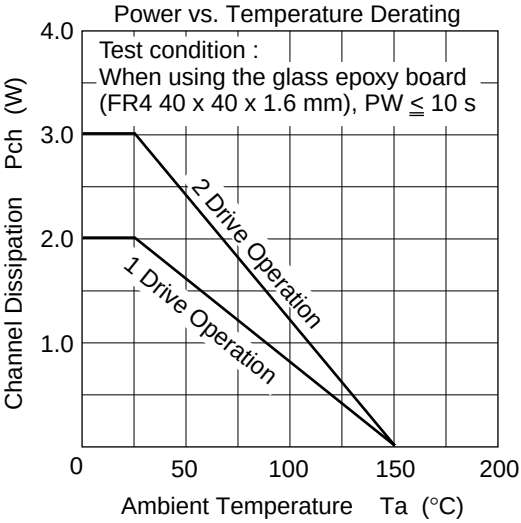
- Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%
2. 1 Drive operation; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10 s
3. 2 Drive operation; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10 s
4. Value at Tch = 25°C, Rg ≥ 50 Ω

Electrical Characteristics (Ta = 25°C)

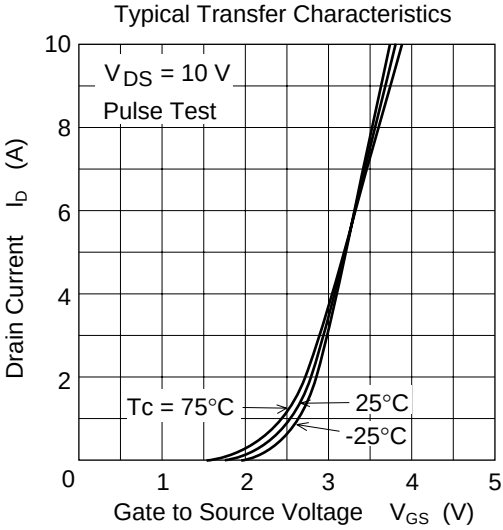
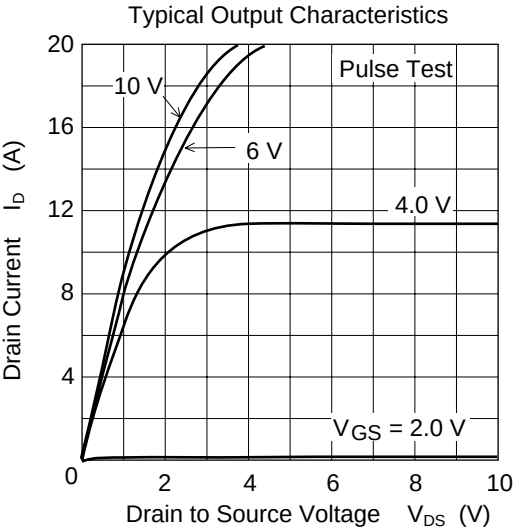
Item		Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage		$V_{(BR)DSS}$	100	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Gate to source breakdown voltage		$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}$, $V_{DS} = 0$
Zero gate voltage drain current	HAT2058R	I_{DSS}	—	—	1	μA	$V_{DS} = 100 \text{ V}$, $V_{GS} = 0$
	HAT2058RJ	I_{DSS}	—	—	0.1	μA	
Zero gate voltage drain current	HAT2058R	I_{DSS}	—	—	—	μA	$V_{DS} = 80 \text{ V}$, $V_{GS} = 0$ $T_a = 125^\circ\text{C}$
	HAT2058RJ	I_{DSS}	—	—	10	μA	
Gate to source cutoff voltage		I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$
Static drain to source on state resistance		$V_{GS(off)}$	1.0	—	2.5	V	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$
Forward transfer admittance		$ y_{fs} $	3	5	—	S	$I_D = 2 \text{ A}^{*1}$, $V_{DS} = 10 \text{ V}$
Static drain to source on state resistance		$R_{DS(on)}$	—	120	145	$\text{m}\Omega$	$I_D = 2 \text{ A}^{*1}$, $V_{GS} = 10 \text{ V}$
		$R_{DS(on)}$	—	150	180	$\text{m}\Omega$	$I_D = 2 \text{ A}^{*1}$, $V_{GS} = 4 \text{ V}$
Input capacitance		C_{iss}	—	420	—	pF	$V_{DS} = 10 \text{ V}$, $V_{GS} = 0$
Output capacitance		C_{oss}	—	180	—	pF	$f = 1 \text{ MHz}$
Reverse transfer capacitance		C_{rss}	—	100	—	pF	
Turn-on delay time		$t_{d(on)}$	—	10	—	ns	$V_{GS} = 10 \text{ V}$, $I_D = 2 \text{ A}$ $V_{DD} \cong 30 \text{ V}$
Rise time		t_r	—	30	—	ns	
Turn-off delay time		$t_{d(off)}$	—	110	—	ns	
Fall time		t_f	—	60	—	ns	
Body-drain diode forward voltage		V_{DF}	—	0.85	1.1	V	$I_F = 4 \text{ A}$, $V_{GS} = 0^{*1}$
Body-drain diode reverse recovery time		t_{rr}	—	75	—	ns	$I_F = 4 \text{ A}$, $V_{GS} = 0$ $diF/dt = 50 \text{ A}/\mu\text{s}$

Note: 1. Pulse test

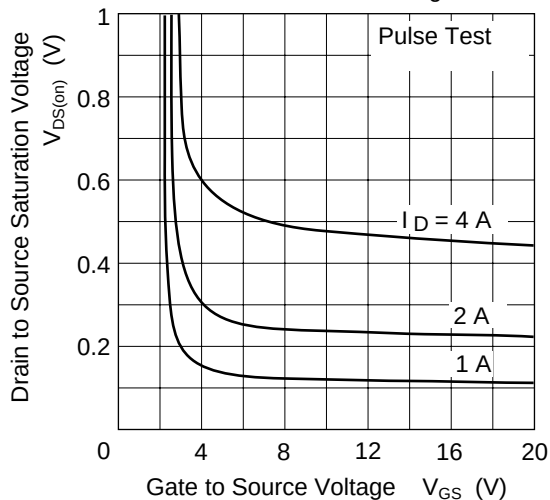
Main Characteristics



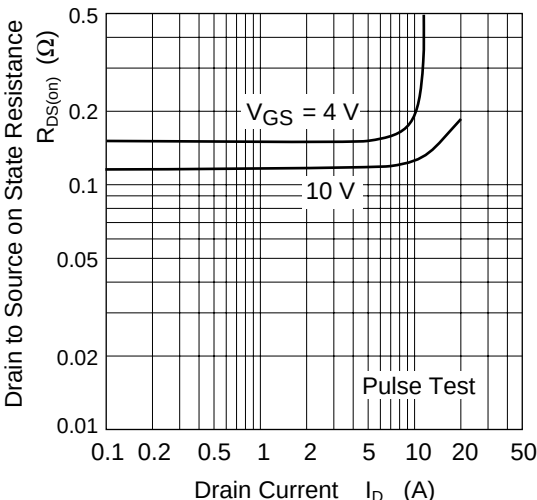
Note 6:
When using the glass epoxy board
(FR4 40 x 40 x 1.6 mm)



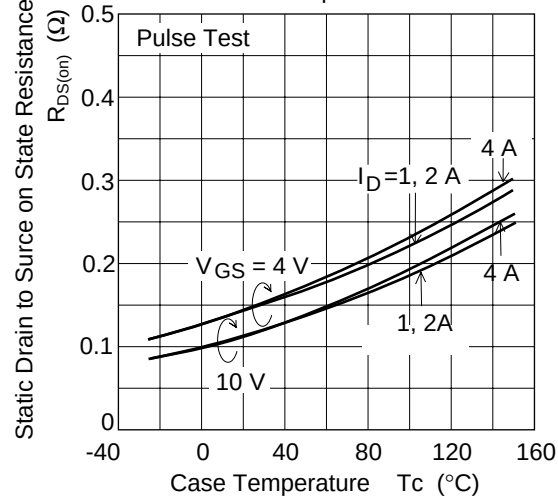
Drain to Source Saturation Voltage vs.
Gate to Source Voltage



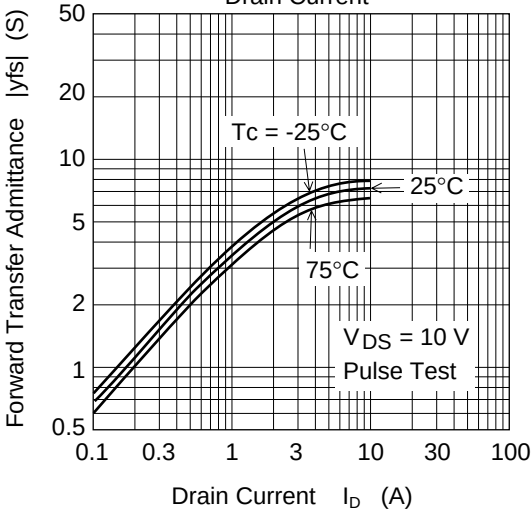
Static Drain to Source on State Resistance
vs. Drain Current

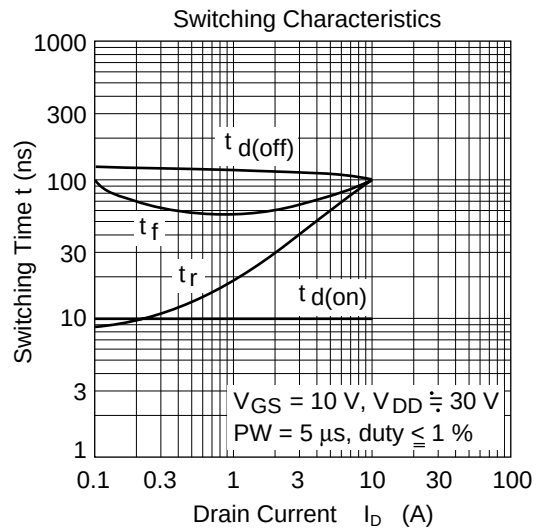
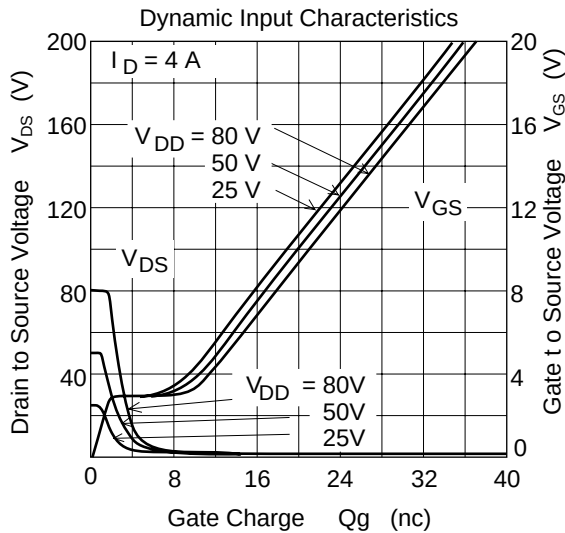
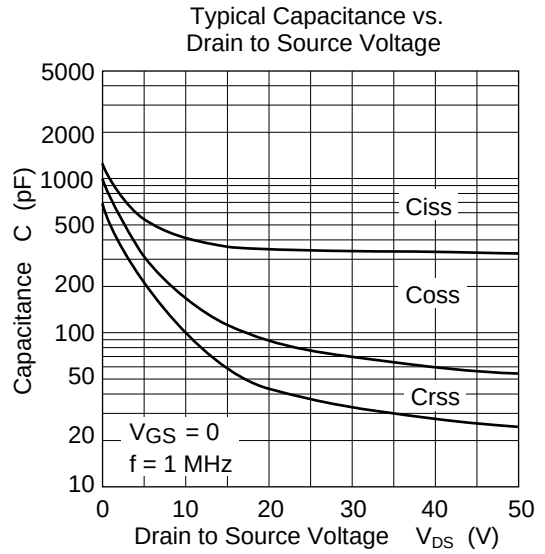
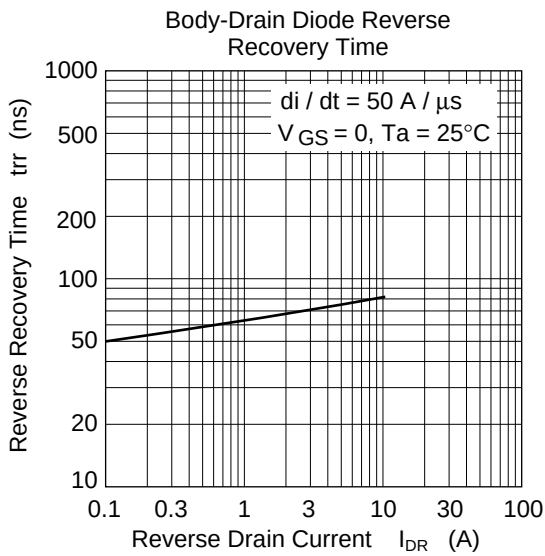


Static Drain to Source on State Resistance
vs. Temperature

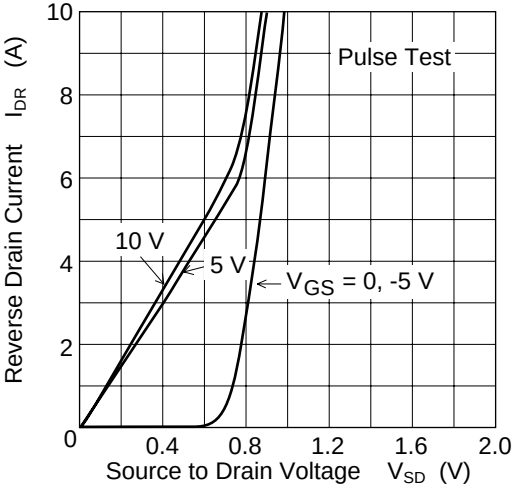


Forward Transfer Admittance vs.
Drain Current

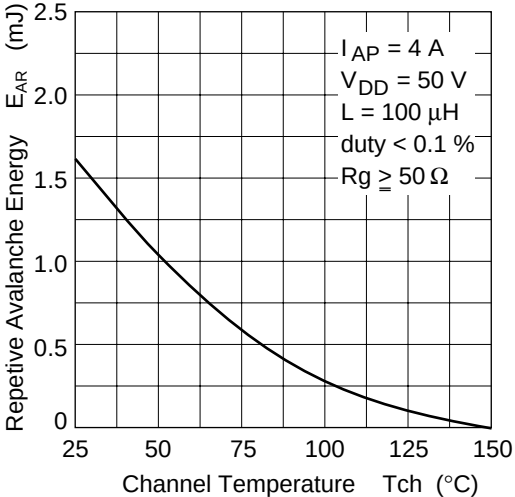




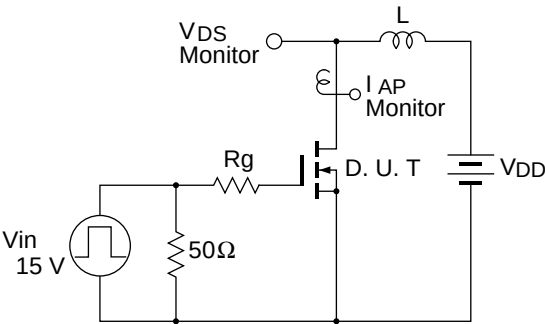
Reverse Drain Current vs.
Source to Drain Voltage



Maximum Avalanche Energy vs.
Channel Temperature Derating

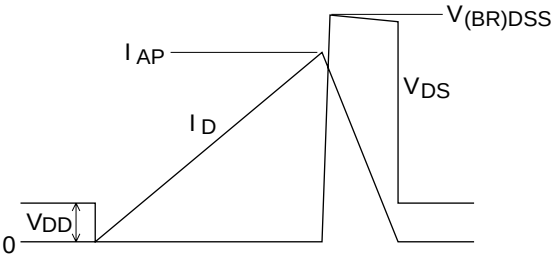


Avalanche Test Circuit

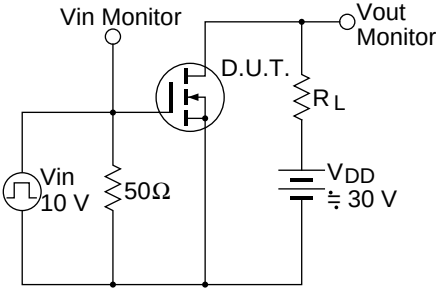


Avalanche Waveform

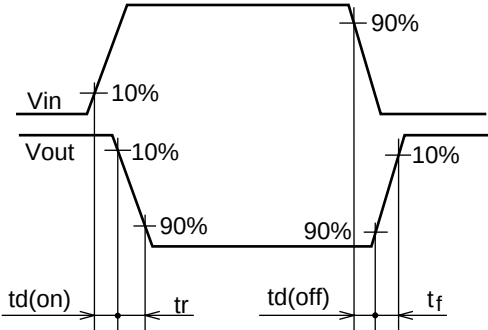
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$

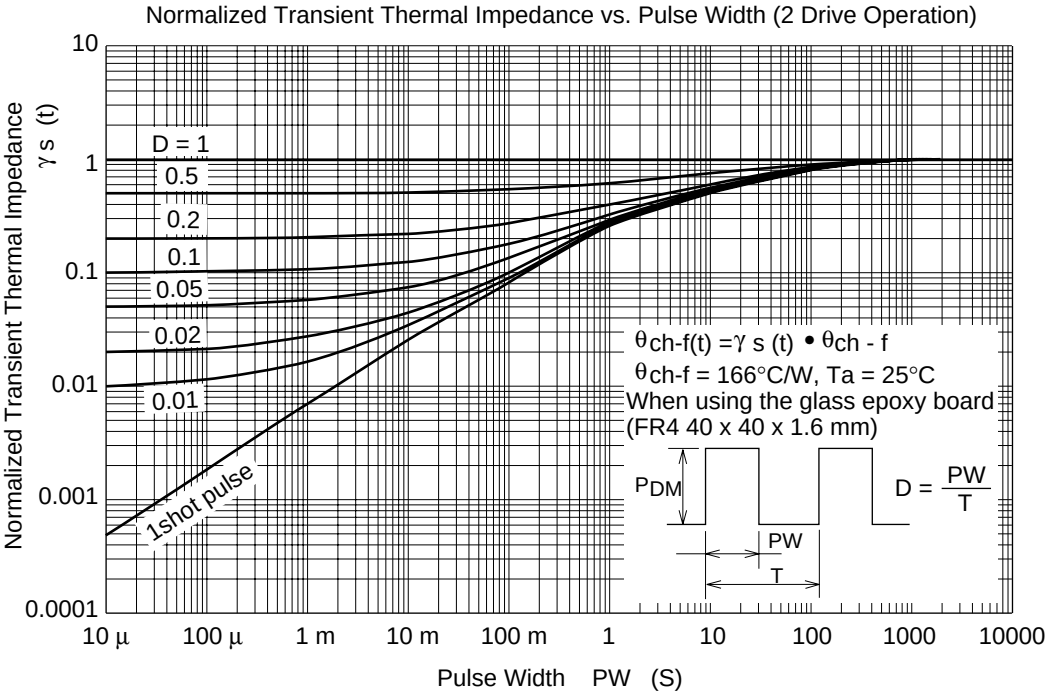
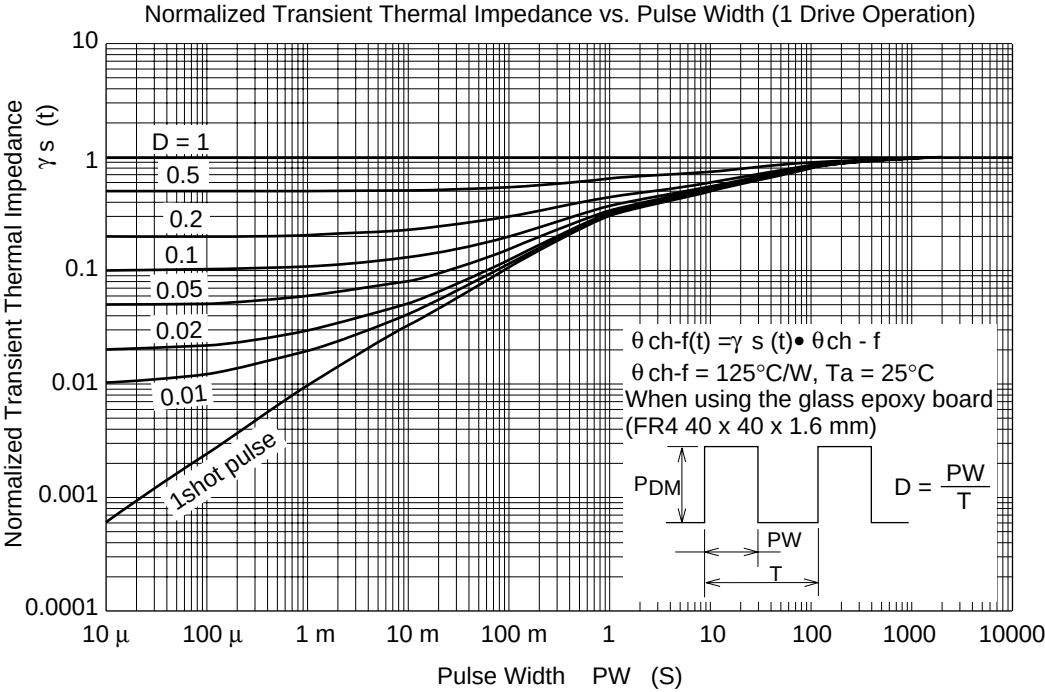


Switching Time Test Circuit



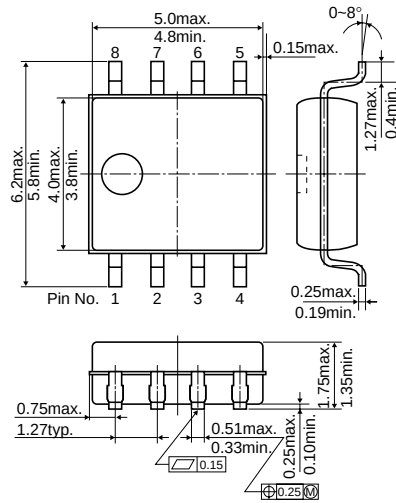
Switching Time Waveform





Package Dimensions

Unit: mm



Hitachi Code	FP-8DA
JEDEC	—
EIAJ	—

Cautions

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
5. This product is not designed to be radiation resistant.
6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

HITACHI

Hitachi, Ltd.

Semiconductor & Integrated Circuits
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: (03) 3270-2111 Fax: (03) 3270-5109

URL	NorthAmerica	:	http://semiconductor.hitachi.com/
	Europe	:	http://www.hitachi-eu.com/hel/ecg
	Asia	:	http://sicapac.hitachi-asia.com
	Japan	:	http://www.hitachi.co.jp/Sicd/indx.htm

For further information write to:

Hitachi Semiconductor (America) Inc. 179 East Tasman Drive San Jose, CA 95134 Tel: <1> (408) 433-1990 Fax: <1> (408) 433-0223	Hitachi Europe Ltd. Electronic Components Group Whitebrook Park Lower Cookham Road Maidenhead Berkshire SL6 8YA, United Kingdom Tel: <44> (1628) 585000 Fax: <44> (1628) 585200
---	--

Hitachi Europe GmbH Electronic Components Group Dornacher StraÙe 3 D-85622 Feldkirchen, Munich Germany Tel: <49> (89) 9 9180-0 Fax: <49> (89) 9 29 30 00
--

Hitachi Asia Ltd. Hitachi Tower 16 Collyer Quay #20-00 Singapore 049318 Tel: <65>-538-6533/538-8577 Fax: <65>-538-6933/538-3877 URL: http://www.hitachi.com.sg
--

Hitachi Asia Ltd. (Taipei Branch Office) 4/F, No. 167, Tun Hwa North Road Hung-Kuo Building Taipei (105), Taiwan Tel: <886>-(2)-2718-3666 Fax: <886>-(2)-2718-8180 Telex: 23222 HAS-TP URL: http://www.hitachi.com.tw

Hitachi Asia (Hong Kong) Ltd. Group III (Electronic Components) 7/F., North Tower World Finance Centre, Harbour City, Canton Road Tsim Sha Tsui, Kowloon Hong Kong Tel: <852>-(2)-735-9218 Fax: <852>-(2)-730-0281 URL: http://semiconductor.hitachi.com.hk
--

Copyright © Hitachi, Ltd., 2001. All rights reserved. Printed in Japan.

Colophon 4.0